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Memo from the WRC Interim Director Faye Sleeper



The Water Resources Center (WRC) has been busy this fall with conferences that highlight research, outreach and implementation and also providing workshops for professionals so they can achieve certification. The Water Resources Conference included some new features, which helped to add new energy to the two days. In addition, a number of people commented on the high quality of presenters in both general sessions and in break-out sessions. The conference is also one time of year when the water community can come together and interact with each other and meet people who are new to the field. I was surprised and pleased when a colleague told me that this was his one annual request for professional development, because of the opportunity to interact with water professionals and hear a wide range of excellent presentations, including the latest research and implementation. View posted water conference presentations>>

This year we hosted the second Climate Adaptation Conference, which drew professionals and citizens from across the spectrum of climate change concerns, from natural resources to construction of eco-friendly infrastructure. Again, the energy was palpable throughout the day and many commented on the high quality of the breakout sessions. The conference also featured two very different speakers in the morning and over lunch, which appealed to different segments of the attendees. Finally, it was nice to recognize a few people/organizations for their important contributions for climate adaptation.

It is easy to let the big events overshadow the ongoing and equally impressive professional training at the Water Resources Center. Annually, through our planned workshops we train over 1700 onsite treatment system professionals, as well as professionals seeking certification in wetland delineation. The Onsite Sewage Treatment Program prepares participants to test for the certification they need to practice in the state of Minnesota, and they ground the training in the latest research done both here at the WRC and in other states. The Wetland Delineation program educates approximately 460 wetland professionals both through regularly scheduled workshops and an annual conference. These are long standing programs which are a core of our outreach and education programming at the Water Resources Center. In addition, we now offer a 14 week online course for those professionals who want to improve their skills in leading watershed and other water projects

focusing on integration of social and natural sciences as well as project management skills. Designed for professionals, this 14 week course also offers undergraduate and graduate credits, so students are getting high quality training at a very affordable price.

We believe that the outreach and education programs of the WRC are right in line with the mission of being part of a land grant institution and Extension, as well as being the Water Resources Research Institute in Minnesota. We thank all of you who continue to strengthen all these programs through your research and engagement at these events.

Faye Sleeper

Interim Director, Water Resources Center

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The Minnesota Water Conference offers up a primer on invasive species, effects of climate change, and agricultural impacts on clean water

After 14th 2014 heralded a new tech-savvy day for the annual Minnesota Water Resources Conference, with attendees encouraged to make use of a mobile guidebook app to plan their days, find sessions of interest as well as tweeting out news the conference as it happened. Exhibitors made their first appearance at the conference, adding a trade show element to the breaks throughout the day.

In the first plenary session, Janet Keough of the Environmental Protection Agency (EPA) Mid-continent Division, presented an overview of research within the EPA. In its mission statement the EPA states its purpose is to protect human health and the environment. Keough identified the biggest environmental issues of the day as climate change and agricultural pollution, particularly nitrogen and phosphorus. She outlined some of the research challenges, such as assessment of chemical toxicity with limited data, as it is not possible to test for all potential chemicals in the water. EPA researchers employ ecotoxicology, the study of the effect of chemicals on a variety of ecosystems, and also foresee future possible environmental degradation resulting from exposure to chemicals of emerging concern. Prediction is important is identifying health risks to humans and the environment. Tuesday's session opened with the presentation of the Dave Ford award, named for an esteemed DNR hydrologist, and this year, presented to another DNR employee who left this life too soon, but also left an indelible mark on the environmental landscape. Roland Sigurdson, who passed away April 30th of this year, was given the award posthumously by the conference planning committee. Faye



Stacey Sigurdson (second from left) accepted the Dave Ford Award on behalf of her late husband Roland. Pictured with Sigurdson are Faye Sleeper, Roland's mother, Renja Sigurdson and Deb Swackhamer.

Sleeper and Jenifer Wical presented the award and Wical quoted retired Extension educator and previous Dave Ford award winner Barbara Liukkonen, who described Roland as the "best environmental educator that I ever knew because he could help people – kids AND adults – see how they fit in with the natural world and why the natural world was important to every one of us. He could take gross stuff . . . and help even the most squeamish people get interested and learn about fish and fish guts. He never teased or criticized anyone who was afraid or squeamish; he just taught on, and sooner or later, he hooked even the most reluctant, particularly kids" Wical, who supervised Roland for 14 years at the DNR, described Roland as a "...friend, confidant, specialist, adviser, teacher, and discoverer and was always reliable, steady, humorous, and skilled. He was recognized nationally as an urban and community fisheries program expert . . .the Governor's fishing opener will never be the same." Stacey Sigurdson accepted the award on Roland's behalf and exhorted the assembly to honor Roland and "get outside."

Tuesday's Luncheon speaker was Paul Douglas who spoke on climate impacts on water resources. In the late 1990's, Douglas, a twin cities meteorologist and software expert, was designing an app to deliver individual forecasts, when he noticed a trend. Research by Douglas revealed that Minnesota's average temperature has warmed by three degrees since the 1830's. In answer to those who think that might be a good thing, Douglas queried: "How healthy did you feel the last time you were three degrees warmer?" Weather events were becoming more extreme, causing "weather whiplash," such as long wet periods followed by periods of drought. He also noted that three inch downpours have doubled since 1964. Another symptom of climate change was last winter's polar vortex, which camped out over Minnesota for 90 days last winter. So why do so many people deny climate change, or the possible negative outcomes? Follow the money. Deniers, Douglas said, want to continue to harvest carbon from the earth, and so began a campaign of disinformation. He believes we need to shrink the denier community through informed science, and by getting the word out that sustainable, cleaner technologies will be good for the economy. Innovation will light the path to reinvention.

Wednesday's plenary speaker was Peter Sorenson, Professor, Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, speaking about his research on invasive carp. All carp in Minnesota are non-native, with the common carp originating in Germany and the Asian carp from that continent. He told the history of carp in Minnesota, of the recent European immigrants in the 1880's missing the carp from their diets, petitioning the U.S. government to import the fish from Germany, which it eventually did. Carp are extremely fertile, and have no natural predators in adulthood as they grow larger than surrounding fish. Carp have turned lake ecosystems upside down, destroying native fish habitat by uprooting plants as they feed, and their waste adding excessive nutrients to the water, creating algae.

The US government made the same mistake 80 years later, bringing Asian carp to the US to battle non-native aquatic plants, again with a strong push from citizens. Unfortunately, the carp ate everything, leaving little for native fish.

So with Asian carp swimming up the Mississippi, Sorenson suggests several things; stop making mistakes with alien species, use the lock and dam systems to keep them out in the short term, and use that time to let science catch up with the problem and offer lasting solutions.

Luncheon speaker Craig Cox, Senior Vice President of the Environmental Working Group, presented Farming and Clean Water: Still Such a Long way to Go. Cox focused on what he called "vulnerable land," acres in production 3-4 months out of

a year, lying dormant the rest of the year, losing soil and chemicals through runoff, exacerbated by the widespread use of drainage tile which efficiently funnels sediment and pollutants into our waterways.

Feasible solutions exist says Cox, so why are they not widely implemented? He pointed to weaknesses in the current volunteer program:

- Volunteers for the program tend to not be the people doing the most damage.
- Good work on individual farms doesn't add up to clean water at the watershed scale.
- Poor targeting of landscape
- Durability; do improvements on the landscape last? What happens when land is sold?

Cox stated that basic standards of care need to be enforced, focusing on farming practices that are damaging and easy to avoid. For example, prevent ephemeral gullies, which are a pipeline for phosphorous and other pollutants, add grassy buffers as a setback to fields. Also, manure application on frozen fields needs to stop, and bovine access to streams contributes to shoreland erosion. Cox stated that the content of the list of basic standards can be argued about, but a list is essential to action.

Conference planning committee co-chair Faye Sleeper was pleased with the conference presentations and the impact of social media features. "This year it felt as though there was a heightened energy at the conference, probably resulting from some of the new features as well as the high quality of the breakout sessions. We anticipate keeping many of the new features next year!"

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Second Climate Adaptation Conference offers science, inspiration and awards

g Minnesota’s Capacity for Climate Adaptation Conference was held Thursday, November 6, 2014 at the Minneapolis hotel. The 250 plus attendees heard about the effect of climate change on weather events from speakers Harold s, National Severe Weather Laboratory, NOAA, and climate resilience strategies from Steve Adams Senior Program or U.S. Climate Adaptation, Institute for Sustainable Communities .

Breakout sessions throughout the day addressed the impacts of a changing climate on recreation and tourism, watershed management, and agriculture among other topics. Participants learned about new plans that have been implemented or tested in various sectors, including human health, local governments, college campuses, resources, recreation, and agriculture.

Minnesota Public Radio meteorologist Paul Huttner filed his mid-morning radio report from the conference, telling listeners, “We are getting heavier rain and less frequently . . .how do farmers deal with this in a cost effective way?” He also highlighted the conference topic of individual actions for climate changes, pointing out how more rain and drought events will force homeowners to manage heavy rainfall and plan ahead for those events.

This conference also marked the inaugural presentation of awards to celebrate early climate adapters in the categories of individual, institution, organization, and private industry. Winners were Erin Pratt and Julia Nerbonne of Minnesota Interfaith Power & Light, Organization Award; Leslie Brandt of the Northern Institute of applied Climate Science, Institution award; Dennis Fuchs from Stearns County Soil Water Conservation District, Institution Award and Paul Douglas, Total Weather, LLC, Individual Award.

Water Resources Center Interim director Faye Sleeper was satisfied with the conference outcome, saying, “This year the planning committee wanted the conference to build on last year’s conference, so we were pleased that the general session speakers and the breakout session speakers spoke on topics that were not broached in 2013 and reached out across Minnesota into sectors that have a wide range of interests.”



Dennis Fuchs from Stearns County Soil and Water Conservation District, was recognized for his work in both urban and rural settings, with landowners and with other units of government, working to increase awareness of climate change at the local level. Fuchs is pictured with Barbara Liukkonen, retired Extension educator, and Mark Seeley, UM Soil, Water and Climate.



Meteorologist Harold Brooks (NOAA, NSSL) addressed his severe weather climatology research in the first morning session. Brooks is pictured here with conference planning team members Faye Sleeper (Interim Director, WRC) and Mark Seeley (UM, Soil, Water and Climate.)

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Deborah Swackhamer named inaugural fellow of the Society of Environmental Toxicology and Chemistry

Deborah Swackhamer, former co-director the University of Minnesota's Water Resources Center (WRC) and professor in the Humphrey School of Public Affairs and School of Public Health, has been named one of 20 inaugural fellows of the Society of Environmental Toxicology and Chemistry (SETAC), the world's largest and most prestigious organization of environmental toxicology chemists.

SETAC fellows are chosen for their extensive contributions and long-term service to the field of environmental toxicology and chemistry through significant scientific and science policy contributions. The hallmark of a SETAC Fellow is leadership within professional and scientific arenas.

"I'm delighted that SETAC has honored Professor Swackhamer," said Brian Buhr, dean of the University's College of Food, Agricultural and Natural Resource Sciences, home to the Water Resources Center. "This honor underscores her academic achievements and international standing among scientists, as well as her contributions to national and international policy, and her legacy of service."


In addition to her academic appointments, Swackhamer is a member of Clean Water Council created through Minnesota's Clean Water Legacy Act and serves on the U.S. Health Effects Institute Committee on National Research Strategy for Unconventional Oil and Gas Extraction. Swackhamer was appointed chair of the U.S. Environmental Protection Agency's Science Advisory Board in 2008, elected president of the National Institutes of Water Resources in 2011, and appointed to University's Charles M. Denny Jr. Chair in Science, Technology and Public Policy, housed in the Humphrey School of Public Affairs in 2011. A Fellow of the Royal Society of Chemistry, Swackhamer received SETAC's Founders Award for lifetime achievement in the environmental sciences in 2009.

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Fifty years of promise: A look at America's commitment to water research since the Water Resources Research Act of 1964

The sun sets on the 50th anniversary of the 1964 Water Resources Research Act (WRRRA), Minnegrām turned to Patrick Brezonik, University of Minnesota Professor Emeritus of Civil, Environmental and Geo-Engineering, and Water Resources Center (WRC) director from 1985 to 2003, for his take on the legislation's legacy.

Signed into law by President Lyndon B. Johnson, the WRRRA established a network of academic-based water resources research institutes (WRRIs) in each state and Puerto Rico. Brezonik was a graduate student in water chemistry at the University of Wisconsin, Madison when the WRRRA was passed in 1964. Under his leadership as a professor in the University's Department of Civil Engineering, and with the help of co-director Professor James Anderson, the WRC grew from a two-person office in the University's Graduate School to one of the most recognized WRRIs in the country.

"There's no question that the Water Resources Research Act's most important legacy is the authorization of the WRRRI program, which created the network of institutes that include the University's own Water Resources Center," says Brezonik. The WRRRI program is a federal-state partnership that provides for competitive grants for state and regional water research projects, financial support in training future water scientists and engineers, and the transfer of water-related research and information to water managers and the general public. Administered by the U.S. Geological Survey (USGS) and housed at land-grant research universities in every state, Brezonik says the institutes continue to play an important in the communication and coordination of water issues.

"Early on, University of Minnesota administrators saw the benefit of having a coordinating unit for water-related workshops and grants," he says. In 1990, Brezonik spearheaded the University's graduate program in Water Resource Sciences, increasing the WRC's academic heft and creating what would become the University's largest interdisciplinary graduate program. WRC's academic profile grew larger when its administrative home moved from the Graduate School to the College of Natural Resources (renamed the College of Food, Agricultural and Natural Resource Sciences in 2006).

"On a positive note, the institutes still play a strong role on their campuses," he says. "They also do great job of serving as coordinators between state and federal agencies. And on the national level, the National Institutes of Water Resources has a collective voice to Congress." Another positive is that the funding is used very effectively through the institute's research

grant programs. Through matching dollars, even small grants can be highly effective in funding locally- and regionally-important research projects and graduate student training.

But the spirit of WRRR has been sorry neglected, says Brezonik: "The system is vastly underfunded. What's missing these days is money. In 1965, the Water Resource Research Act funded the institutes at around \$250,000 per year, which at the time, was a fair amount of money. Today, the institutes only get a fraction of that amount and the funding is shared with the USGS."

An agency of the U.S. Department of the Interior, the USGS has struggled to maintain its own funding. "Despite good relations and a track record of cooperation, there is inevitable competition between the USGS' own core water program and the Institutes," he says. Additionally, NIWR funding is equally divided between all 54 institutes. Brezonik thinks Congress would be more inclined to increase funding for a program that is competitive between states and regions.

Although Brezonik isn't particularly hopeful for increased federal funding in the short term, he's optimistic that Congress' interest in water issues will grow. "With climate change occurring—and seemingly accelerating – water problems are going to be more severe and we're going to need more resources. In the mid-term, we're going to need more resources directed at research on both water quality and quantity."

"We have such a divided political climate at the moment that WRRR's legacy is in the balance. For now, perhaps the best we can hope for is the status quo," he says. "But in the longer term, water issues are getting very serious—even with our abundance of water, Minnesota doesn't have a surplus."



Graduate student Pat
Brezonik in 1965
and the professor
emeritus today.

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Minnesota communities look for ways to adapt to climate change

MPR story on [Minnesota communities look for ways to adapt to climate change](#) on the MPR News website.

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Management at the Science–Policy Interface
G. Hering David A. Dzombak, Sarah A. Green, Richard G. Luthy, and Deborah Swackhamer
Journal of Environmental Science and Technology 2014
<https://doi.org/10.1021/es504225t>

Guild for Maintaining Rural Roadside Ditches

Minnesota Sea Grant, UMD’s Natural Resources Research Institute, and Fortin Consulting
This free publication is available as a spiral-bound 94-page book and as an online [PDF](#)

Sediment–water distribution of contaminants of emerging concern in a mixed use watershed
Fairbairn, D.J., M.E. Karpuzcu, W.A. Arnold, B.L. Barber, E.F. Kaufenberg, W.C. Koskinen, P.J. Novak, P.J. Rice, and D.L. Swackhamer, *Science of the Total Environment*, 2015. 505(0): p. 896-904.
This [study](#) evaluated the occurrence and distribution of 15 contaminants of emerging concern (CECs) in stream water and sediments in the Zumbro River watershed in Minnesota and compared these with sub-watershed land uses. Sixty pairs of sediment and water samples were collected across all seasons from four stream sites for over two years and analyzed for selected personal care products, pesticides, human and veterinary medications, and phytoestrogens.

Sulfate was a trace constituent of Archean seawater
S. A. Crowe, G. Paris, S. Katsev, C. Jones, S.-T. Kim, A. L. Zerkle, S. Nomosatryo, D. A. Fowle, J. F. Adkins, A. L. Sessions, J. Farquhar, D. E. Canfield. *Science*, 2014; 346 (6210): 735 DOI:
Earth’s ancient oceans held much lower concentrations of sulfate -- a key biological nutrient -- than previously recognized, according to new research. The findings paint a new portrait of our planet's early biosphere and primitive marine life. Organisms require sulfur as a nutrient, and it plays a central role in regulating atmospheric chemistry and global climate. [Article>>](#)

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Minnesota Wetlands Conference

Landscape Arboretum
St. Paul, Minnesota

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February 8-11, 2015

Upper Midwest Stream Restoration Symposium (UMSRS)

Dubuque, Iowa

UMSRS is designed to foster exchange, conversation and new collaboration amongst stream and river restoration practitioners in the Midwest. At UMSRS, professionals & students all gather to listen to single-track presentations on stream restoration projects and science, promoting multi-disciplinary dialogue and discussion.

[Information and registration>>](#)

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Winter 2015 Community News

Bilotta (UM Extension, Sea Grant) co-led the 2014 Clean Water Summit at the University of Minnesota Landscape Forum on September 11, 2014, *Green Infrastructure for Clean Water: Cost and Benefits to our Communities*. Nearly 200 planners, engineers, landscape architects, and leaders attended. Presentations from the Summit were recorded. **Bilotta** also led a workshop with nearly 100 low impact development and stormwater professionals at the [2014 Minnesota Water Resources Conference](#). The workshop featured aspects from more than six University researchers and staff projects on stormwater BMPs and two signature community projects. Bilotta serves on the planning committee for the full conference that included nearly 600 participants.

Doug Jensen, Aquatic Invasive Species Program Coordinator, Jeff Gunderson, Marte Kitson, Aquatic Invasive Species Specialist, Hilarie Sorensen, Climate Change Extension Educator, Dale Bergeron, Maritime Extension Educator, Chris Benson, Information Designer, and Sharon Moen, Communications Coordinator, contributed to the success of the 2014 Upper Midwest Invasive Species Conference in Duluth, Minnesota Oct 20-22, 2014. **Minnesota Sea Grant's** contributions ranged from planning, presenting, media relations, photography and coordinating sessions. The conference attracted nearly 700 attendees.

John Gulliver (WRS faculty, CE) traveled to Kuching, Malaysia September, 2014 to give two talks at the International Conference on Urban Drainage, "Impacts Of Climate Change On Stormwater Infrastructure In A Mid-Continent City," co-authored by Trisha Moore and "Infiltration Into Roadside Grassed Swales," co-authored by **John Nieber** (WRS faculty, BBE).

Sergei Katsev (WRS faculty, UMD Physics and LLO) visited the University of Western Australia July-August, 2013 as a Gledden Visiting Fellow. The Gledden Visiting Fellowships are part of the estate bequeathed to the University by the late Robert John Gledden to promote and encourage education and research at the University of Western Australia in the disciplines of applied science, more particularly relating to surveying, engineering, mining or cognate subjects.

Minnesota Governor's Geospatial Commendation award was presented at the Minnesota Annual GIS/LIS Conference in Rochester, Minnesota, October 2, 2014 to The Minnesota Elevation Mapping Project. Certificates were presented to representatives of the Minnesota Department of Natural Resources, Minnesota Geospatial Information Office, Minnesota

Department of Transportation, the University of Minnesota, and United States Geological Service for their contributions to the project. **Les Everett** of the Water Resources Center (WRC) accepted the certificate for the UM. Everett led the legislative request to obtain the project funding, and with **Ann Lewandowski** (WRC), led the training program for local conservation staff on use of the LiDAR derived elevation data for conservation applications. **Joel Nelson** (UM, Soil, Water, and Climate), **Ann Johnson** (UM, Civil Engineering), and Paul Bolstad, **Joseph Knight**, and **Andrew Jenks** (WRS faculty, Forest Resources) along with Sean Vaughn (MN DNR) developed and delivered the training modules.

More information on the commendation at the [MnGeo webpage](#).

Minnegram Winter 2015


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Winter 2015 Student News

Gloege received his MS Degree in August 2014. Gloege's thesis was titled: Modeling Near-Inertial Waves in Lake Superior. Gloege was advised by **Jay Austin**.

Ross received her MS Degree in September 2014. Her thesis was titled: Constructed Wetland Used to Treat Nitrate Pollution Generated from Agricultural Tile Drainage Waters in Southern Minnesota. Ross was advised by **Chris Lenhart** and **Joe Wagner**.

Leah Smith received her MS Degree in July 2014. Her thesis title was: BMP Nutrient and Sediment Reductions and Implementation Strategies for the Prioritization, Targeting, and Measuring Water Quality Improvement Application (PTMA). Smith was advised by **Joe Wagner**.

Jill Coleman Wasik received her Ph.D. in July 2014. Her dissertation was titled: The Effect of Atmospheric Sulfate Deposition on Mercury Biogeochemistry in an Experimental Peatland: Impacts, Recovery, and Natural Variability. Coleman Wasik was advised by **Daniel Engstrom**.

Brittany Kruger received her Ph.D. in August 2014. Her dissertation was titled: Sources, Cycling, and Fate of Organic Matter in Large Lakes: Insights from Stable Isotope and Radiocarbon Analysis in Lakes Malawi and Superior. Kruger was advised by **Josef Werne**.

Hongyu Li received her Ph.D. in August 2014. Her dissertation was titled: Organic Matter Biogeochemical Characteristics in Lake Superior: Insights into Composition, Source and Reactivity. Li was advised by **Elizabeth Austin-Minor**.

Jiying Li received his Ph.D. in September 2014. His dissertation was titled: Sediment diagenesis in large lakes Superior and Malawi, geochemical cycles and budgets and comparisons to marine sediments. Li was advised by **Sergei Katsev**.

Shahram Missaghi received his Ph.D. in August 2014. His dissertation was titled: Three dimensional water quality modeling in a shallow lake with complex morphometry; implications for coolwater fish habitat under changing climate. Missaghi was advised by **Lorin Hatch**.

A WRS Retreat is scheduled for March 21-22 at the Audubon Center. The retreat is open to WRS faculty and students interested in participating. Anyone with questions should contact: wrs@umn.edu

New Faculty:

Tedy Ozersky - Assistant Professor, UMD Biology. & Large Lakes Observatory

Courses Taught: Biology 2801 (General Ecology)

Kyungsoo Yoo - Associate Professor, of Soil, Water, and Climate

Courses Taught: LAAS 5515 (Soil Formation) & ESPM 2021 (Environmental Sciences)

Thomas Hollenhorst - Research Fellow, UMD-NRRI

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